



Draft Health Effects Analysis

South Coast Air Quality
Management District
Advisory Council

August 10 , 2022



Outline



Advisory Council Mechanics and Objectives



U.S. EPA's recent review on PM2.5 and Ozone NAAQS



Health Effects of Criteria Air Pollutants

- Particulate Matter (PM2.5)
- Ozone (O₃)
- Nitrogen Dioxide (NO₂)
- Sulfur Dioxide (SO₂)
- Carbon Monoxide (CO)
- Lead (Pb)



Next Steps and Discussion

Advisory Council

- California Health and Safety Code §40471(b) requires the Advisory Council to review the health impacts of air pollution during the development of an Air Quality Management Plan (AQMP)
- The current Advisory Council is formed to review and provide feedback on the health effects analysis to be included in the 2022 AQMP
- The 2022 AQMP is focused on attaining the 2015 ozone air quality standard but health effects from all criteria air pollutants are broadly covered.

Advisory Council Membership

- According to South Coast AQMD's Advisory Council Mechanics, the Council consists of 18 members



1 Governing Board Chair appointee serves as a liaison with the council to the Governing Board



12 members appointed by each member of the Governing Board

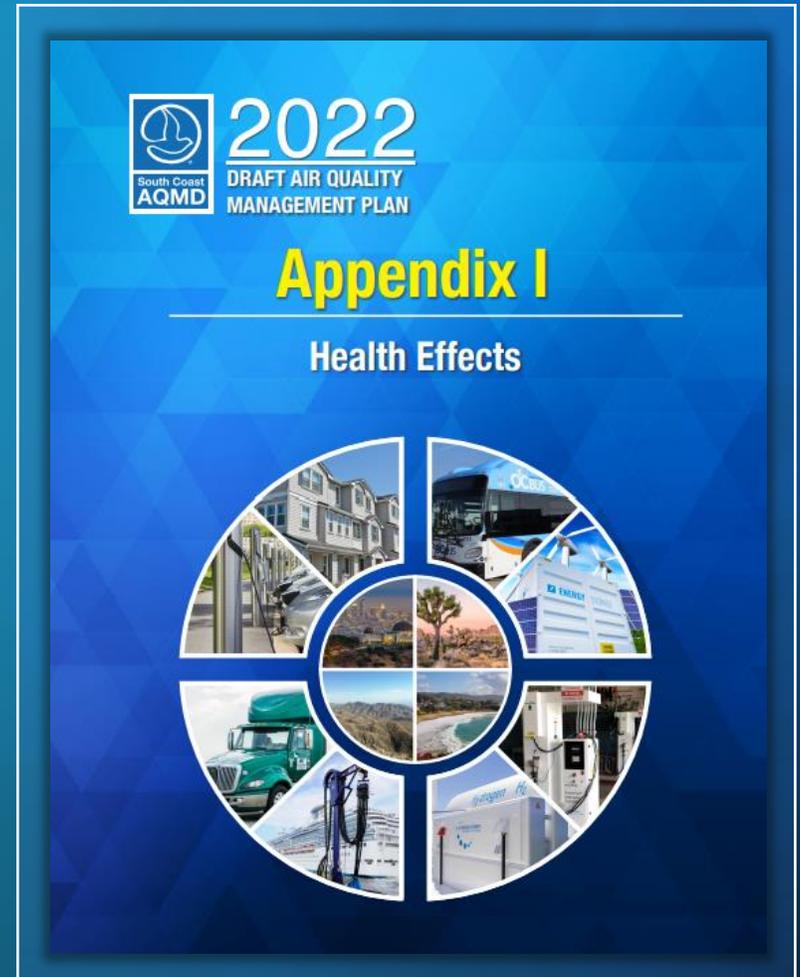


1 representative from each active advisory group:

- Air Quality Management Plan Advisory Group
- Clean Fuels Advisory Group
- Environmental Justice Advisory Group
- Local Government and Small Business Assistance Advisory Group
- Scientific, Technical, and Modeling Peer Review Advisory Group

Health Effects Analysis

- Appendix I of the Draft 2022 AQMP discusses health effects of PM2.5, ozone and other criteria pollutants
- A draft Appendix I is available at <http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan>



U.S. EPA's Recent Review on PM NAAQS

- On December 7, 2020, U.S. EPA announced its decision to retain, without revision, the existing primary (health-based) and secondary (welfare-based) National Ambient Air Quality Standards (NAAQS) for particulate matter
- Currently, the U.S. EPA has primary and secondary standards for PM_{2.5} (annual average standards with levels of 12.0 $\mu\text{g}/\text{m}^3$ and 15.0 $\mu\text{g}/\text{m}^3$, respectively; 24-hour standards with 98th percentile forms and levels of 35 $\mu\text{g}/\text{m}^3$) and PM₁₀ (24-hour standards with one-expected exceedance forms and levels of 150 $\mu\text{g}/\text{m}^3$)

U.S. EPA's Recent Review on PM NAAQS (cont'd)

- On June 10, 2021, U.S. EPA announced it will reconsider the December 2020 decision to retain the standard
 - The evidence presented within the 2019 ISA, along with the targeted identification and evaluation of scientific information in the ISA Supplement, provides the scientific basis for the reconsideration of the 2020 PM NAAQS
- The Policy Assessment (PA) for the Reconsideration of PM NAAQS was released in May 2022
 - Primary standards could be lower; 8-10 $\mu\text{g}/\text{m}^3$ for Annual average and 25-30 $\mu\text{g}/\text{m}^3$ for 24-hour average

U.S. EPA's Recent Review on Ozone NAAQS

- On December 23, 2020, U.S. EPA completed its review of the full body of currently available scientific evidence and exposure/risk information and decided to retain the existing ozone NAAQS
- The existing primary and secondary standards, established in 2015, are 0.070 parts per million (ppm), as the fourth-highest daily maximum 8-hour concentration, averaged across three consecutive years
- On October 29, 2021 the U.S. EPA announced that it will reconsider the 2020 decision to retain the ozone standard.
- A draft Policy Assessment for the Reconsideration of Ozone NAAQS was released in April 2022

Pollutants Included in Health Effects Analysis

- 6 criteria pollutants
 - Particulate Matter (PM_{2.5})
 - Ozone (O₃)
 - Nitrogen Dioxide (NO₂)
 - Sulfur Dioxide (SO₂)
 - Carbon Monoxide (CO)
 - Lead (Pb)



Sources of Information

- Previous Reviews (South Coast Air Quality Management District 1996; 2003; 2007; 2013b, 2016)
- Most Recent U.S. EPA Integrated Science Assessment (ISA) reviews
 - Ozone (U.S. EPA, 2020), Carbon Monoxide (U.S. EPA 2010), Particulate Matter (U.S. EPA 2019), Nitrogen Oxides (U.S. EPA 2016), Sulfur Dioxide (U.S. EPA 2017), and Lead (U.S. EPA, 2013a)
 - Policy Assessment for the Reconsideration for Particulate Matter NAAQS (May 2022)
 - Draft Policy Assessment for ozone NAAQS (April 2022)

Sources of Information (Cont'd)

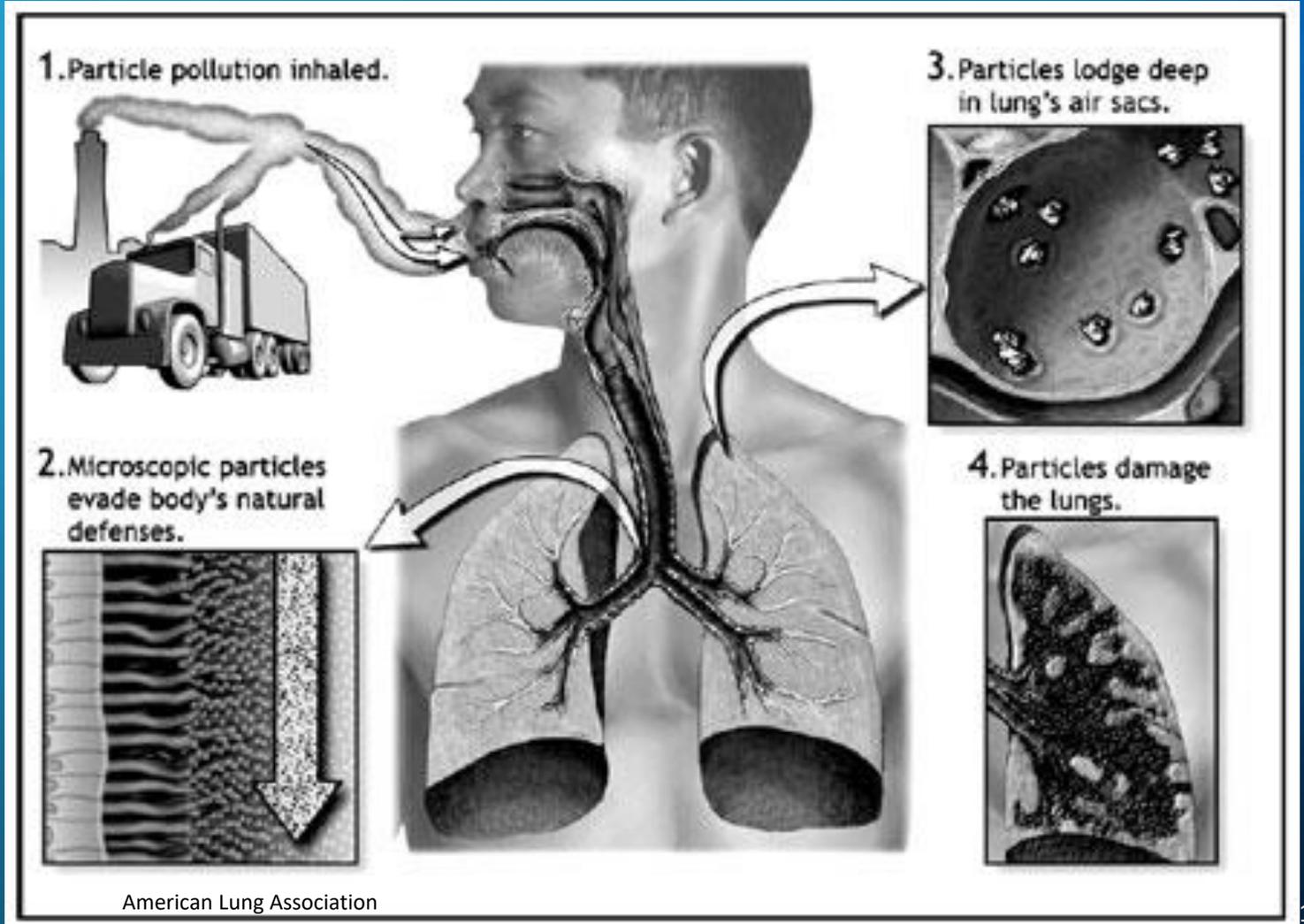
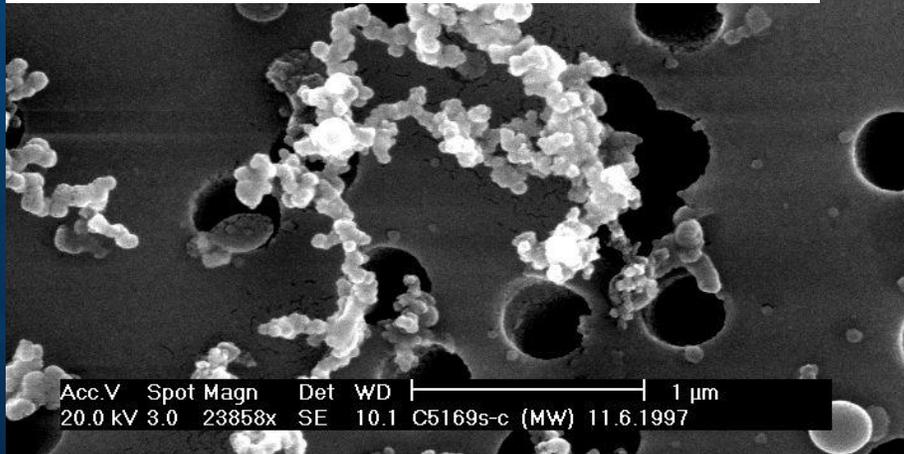
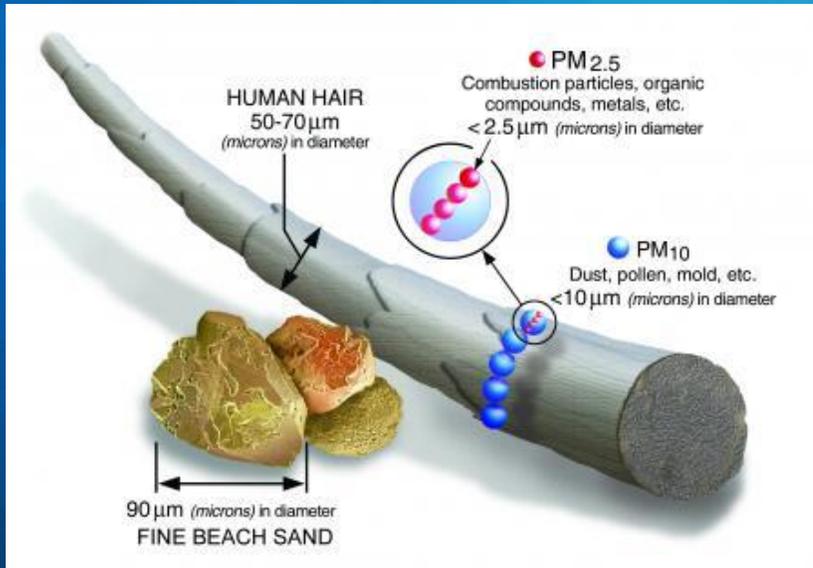
- Additional reviews prepared by the California Air Resources Board and the California EPA Office of Environmental Health Hazard Assessment
 - Particulate Matter (California Air Resources Board and Office of Environmental Health Hazard Assessment 2002)
 - Ozone (California Air Resources Board and Office of Environmental Health Hazard Assessment 2005)
 - Nitrogen Dioxide (California Air Resources Board and Office of Environmental Health Hazard Assessment 2007)
- Recent literature (since the most current ISA)
- Large review articles on the health effects of air pollution (American Thoracic Society 1996a; Brunekreef et al. 2002).

U.S. EPA's Weight of Evidence Descriptions for Causal Determination of Health Effects



- Causal Relationship
- Likely to Be a Causal Relationship
- Suggestive of, but Not Sufficient to Infer, a Causal Relationship
- Inadequate to Infer the Presence or Absence of a Causal Relationship
- Not Likely to Be a Causal Relationship

PM2.5



Health Effects Summary – PM2.5

Stronger Evidence

Short Term

- Cardiovascular Effects (Causal)
- Respiratory Effects (Likely Causal)

Long Term

- Cardiovascular Effects (Causal)
- Respiratory Effects (Likely Causal)
- Nervous System Effects (Likely Causal)

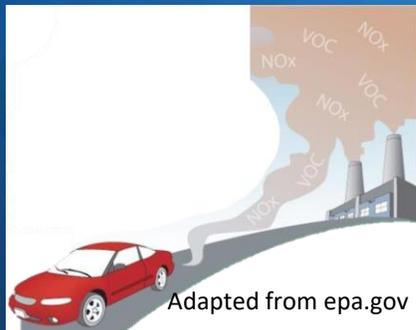
Less Evidence

Short Term (Suggestive of Relationship)

- Metabolic Effects
- Nervous System Effects

Long Term (Suggestive of Relationship)

- Metabolic Effects
- Reproductive and Development



Health Effects Summary – PM2.5

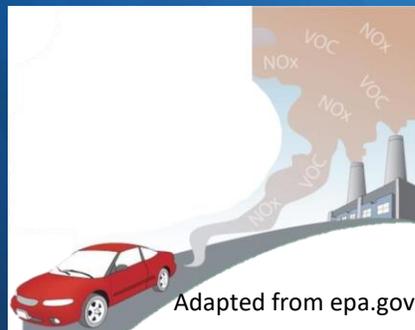
Respiratory Effects

Short Term (Causal)

- Asthma exacerbation
- Chronic Obstructive Pulmonary Disease (COPD) Exacerbation
- Combined Respiratory-Related Diseases

Long Term (Likely Causal)

- Lung development (lung function growth)
- Asthma development/prevalence in children
- Childhood wheeze
- Pulmonary inflammation



Health Effects Summary – PM2.5

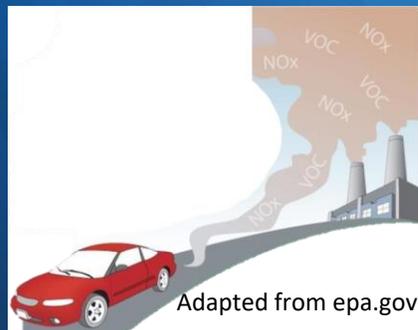
Cardiovascular Effects

Short Term (Causal)

- Heart Disease
- Heart Failure
- Cardiovascular related mortality (Arrhythmia, Thrombosis)

Long Term (Causal)

- Cardiovascular Mortality
- Cardiovascular Morbidity

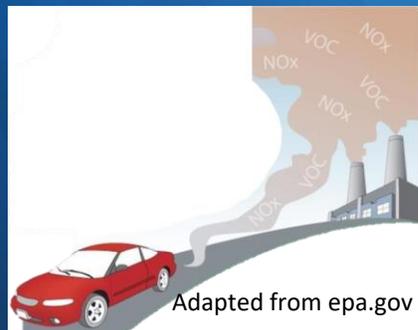


Health Effects Summary – PM2.5

Nervous System

Long Term (Likely Causal)

- Neuroinflammation (hippocampus, cerebral cortex, hypothalamus)
- Morphologic changes (neurodegeneration)



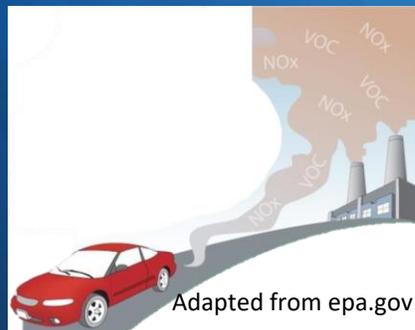
Health Effects Summary – PM2.5

Cancer and Total Mortality

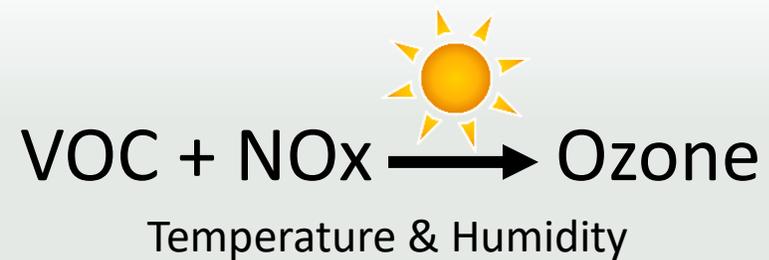
Cancer (Likely Causal)

- Genotoxicity
- Epigenetic effects (i.e., hypo-and hypermethylation of DNA)
- Carcinogenic
- Increases in the risk of lung cancer incidence and mortality

Total Mortality (Causal)



Ozone



VOC & NO_x Emissions

Mobile sources



Stationary sources



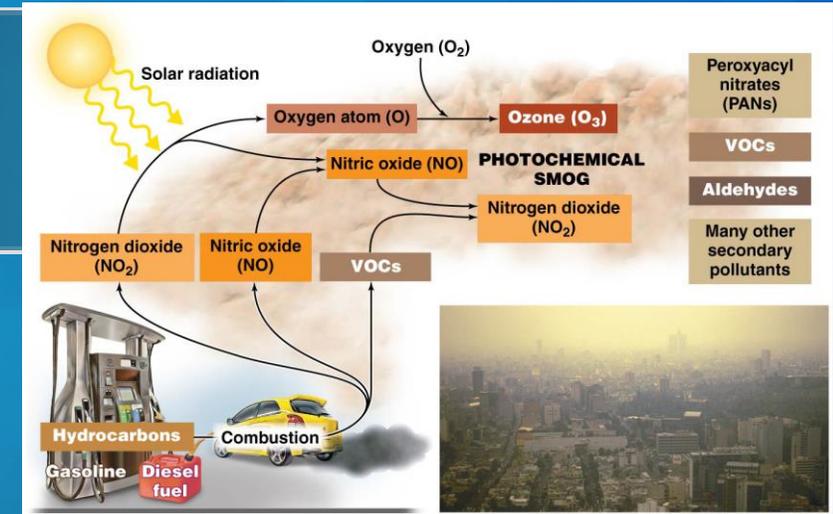
Biogenics



Wildfires



Health Effects Summary – Ozone



Stronger Evidence

Short Term

- Respiratory Effects (Causal)
- Metabolic Effects (Likely Causal)

Long Term

- Respiratory Effects (Likely Causal)

Less Evidence

Short Term (Suggestive of Relationship)

- Cardiovascular Effects
- Total Mortality
- Central Nervous System Effects

Long Term (Suggestive of Relationship)

- Cardiovascular Effects
- Metabolic Effects
- Total Mortality
- Reproductive Effects
- Central Nervous System Effects



Health Effects Summary – NO_x



US National Park Service



Wikimedia Commons

Stronger Evidence

Short Term

- Respiratory Effects (Causal)

Long Term

- Respiratory Effects (Likely Causal)
 - e.g., asthma

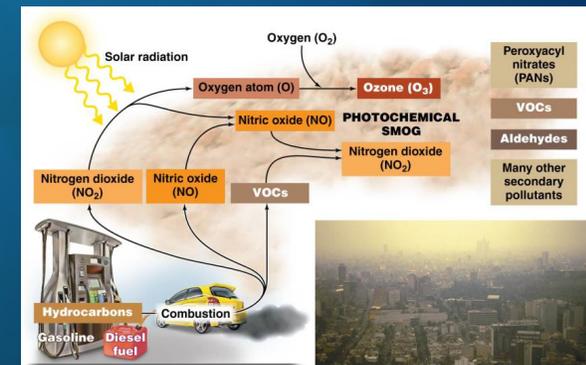
Less Evidence

Short Term (Suggestive of Relationship)

- Cardiovascular and Related Metabolic Effects
- Total Mortality

Long Term (Suggestive of Relationship)

- Cardiovascular and Related Metabolic Effects
- Birth Outcomes
- Total Mortality
- Cancer



Health Effects Summary – SO₂



Stronger Evidence

Short Term

- Respiratory Morbidity (Causal)

Long Term

Less Evidence

Short Term (Suggestive of Relationship)

- Mortality

Long Term (Suggestive of Relationship)

- Respiratory Morbidity



Health Effects Summary – CO

Stronger Evidence

Short Term

- Cardiovascular Morbidity (Likely Causal)

Long Term

Less Evidence

Short Term (Suggestive of Relationship)

- Central Nervous System
- Respiratory Morbidity
- Mortality

Long Term (Suggestive of Relationship)

- Central Nervous System
- Birth Outcomes and Developmental Effects

Health Effects Summary – Lead

Children (Causal)

- Cognitive Function Decrements
- Externalizing Behaviors: Attention, Impulsivity and Hyperactivity

Children (Likely Causal)

- Externalizing Behaviors: Conduct Disorders in Children and Young Adults
- Internalizing Behaviors
- Auditory Function Decrements
- Motor Function Deficits

Adults (Likely Causal)

- Cognitive Function Decrements
- Psychopathological Effects

Stronger Evidence

Less Evidence

Health Effects Summary – Lead

Causal

- Hypertension
- Coronary Heart Disease
- Decreased Red Blood Cell Survival and Function
- Altered Heme Synthesis
- Development
- Male Reproductive Function

Likely Causal

- Atopic and Inflammatory Response
- Decreased Host Resistance
- Cancer

Suggestive of Relationship

- Subclinical Atherosclerosis
- Reduced Kidney Function
- Birth Outcomes (low birth weight, spontaneous abortion)
- Female Reproductive Function

Stronger Evidence

Less Evidence

Next Steps



South Coast AQMD Board consideration for the 2022 AQMP on December 2, 2022



Regional Public Hearings for the Revised Draft 2022 AQMP package in mid October

- Revised Draft 2022 AQMP
- Health Effects
- CEQA
- Socio Economic Analysis



Release revised Health Effect Report in late August to early September



Written Comments by the Council Members by August 12, 2022

Open Discussion

- Please use the “raise hand” feature to speak:
 -  Click on the  button
 -  Dial *9
- When it is your turn to speak, your name will be announced and the meeting host will unmute you

DRAFT 2022 AQMP Health Effect Analysis

*Thank You For
Attending*

